

Print selected from Online session Page 1 02/22/2003

(FILE 'HOME' ENTERED AT 14:05:27 ON 22 FEB 2003)

FILE 'REGISTRY' ENTERED AT 14:05:33 ON 22 FEB 2003

E $\text{CAO.2FeO.8LiO4P/MF}$
E $\text{CAO.2FeO.8Li(PO4)/MF}$
E LITHIUM CALCIUM IRON PHOSPHATE/CN
E $\text{LICA0.2FeO.8(PO4)/MF}$
E FELI(PO4)/MF

L1 1 S E9
E CALCIUM IRON LITHIUM PHOSPHATE/CN
L2 3 S E4-E6

FILE 'CAPLUS' ENTERED AT 14:13:55 ON 22 FEB 2003

L3 9 S L1
L4 5 S L2

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L4 5 L2

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YOU HAVE REQUESTED DATA FROM 5 ANSWERS - CONTINUE? Y/(N):y

L4 ANSWER 1 OF 5 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 2002:256757 CAPLUS

DOCUMENT NUMBER: 136:282003

TITLE: Lithium-based cathode active materials for rechargeable lithium battery and preparation thereof

INVENTOR(S): Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffrey L.

PATENT ASSIGNEE(S): UK

SOURCE: U.S. Pat. Appl. Publ., 39 pp., Cont.-in-part of U. S. Ser. No. 484,799.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002039687	A1	20020404	US 2001-908480	20010718
WO 2001054212	A1	20010726	WO 2000-US35302	20001222

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.: US 2000-484799 A2 20000118
WO 2000-US35302 W 20001222

AB The invention provides novel lithium-mixed metal materials which, upon electrochem. interaction, release lithium ions, and are capable of reversibly cycling lithium ions. The invention provides a rechargeable lithium battery which comprises an electrode formed from the novel lithium-mixed metal materials. Methods for making the novel lithium-mixed metal materials and methods for using such lithium-mixed metal materials in electrochem. cells are also provided. The lithium-mixed metal materials comprise lithium and at least one other metal besides lithium. Preferred materials are lithium-mixed metal phosphates which contain lithium and two other metals besides lithium.

IT Battery cathodes
(lithium-based cathode active materials for rechargeable lithium battery and prepn. thereof)

IT Olivine-group minerals

RL: DEV (Device component use); USES (Uses)

(lithium-based cathode active materials for rechargeable lithium battery and prepn. thereof)

IT Secondary batteries

(lithium; lithium-based cathode active materials for rechargeable lithium battery and prepn. thereof)

- IT 405914-52-5, Cobalt lithium magnesium phosphate ((Co,Mg)Li(P04))
405914-53-6, Cobalt lithium magnesium phosphate (Co0.9LiMg0.1(P04))
405914-58-1, Cobalt lithium magnesium phosphate (Co0.95LiMg0.05(P04))
405914-63-8 405914-68-3, Calcium cobalt lithium phosphate
((Ca,Co)Li(P04)) 405914-73-0, Calcium cobalt lithium phosphate
(Ca0.1Co0.9Li(P04)) 405914-83-2, Cobalt lithium zinc phosphate
((Co,Zn)Li(P04)) 405914-88-7, Cobalt lithium zinc phosphate
(Co0.9LiZn0.1(P04)) 405914-93-4, Cobalt lithium strontium phosphate
((Co,Sr)Li(P04)) 405914-98-9, Cobalt lead lithium phosphate
((Co,Pb)Li(P04)) 405915-04-0, Cadmium cobalt lithium phosphate
((Cd,Co)Li(P04)) 405915-09-5, Cobalt lithium tin phosphate
((Co,Sn)Li(P04)) 405915-14-2, Barium cobalt lithium phosphate
((Ba,Co)Li(P04)) 405915-21-1, Beryllium cobalt lithium phosphate
((Be,Co)Li(P04)) 405915-29-9, Cobalt lithium magnesium phosphate
(Co0.5-1LiMg0-0.5(P04)) 405915-34-6, Cobalt lithium magnesium phosphate
(Co0.8-1LiMg0-0.2(P04)) 405915-39-1, Calcium cobalt lithium phosphate
(Ca0-0.5Co0.5-1Li(P04)) 405915-44-8, Calcium cobalt lithium phosphate
(Ca0-0.2Co0.8-1Li(P04)) 405915-48-2, Cobalt lithium zinc phosphate
(Co0.5-1LiZn0-0.5(P04)) 405915-51-7, Cobalt lithium zinc phosphate
(Co0.8-1LiZn0-0.2(P04)) 405915-56-2, Cobalt lithium strontium phosphate
(Co0.5-1LiSr0-0.5(P04)) 405915-59-5, Cobalt lithium strontium phosphate
(Co0.8-1LiSr0-0.2(P04)) 405915-63-1, Cobalt lead lithium phosphate
(Co0.5-1Pb0-0.5Li(P04)) 405915-66-4, Cobalt lead lithium phosphate
(Co0.8-1Pb0-0.2Li(P04)) 405915-69-7, Cadmium cobalt lithium phosphate
(Cd0-0.5Co0.5-1Li(P04)) 405915-79-9, Cadmium cobalt lithium phosphate
(Cd0-0.2Co0.8-1Li(P04)) 405915-82-4, Cobalt lithium tin phosphate
(Co0.8-1LiSn0-0.2(P04)) 405915-85-7, Cobalt lithium tin phosphate
(Co0.95-1LiSn0-0.05(P04)) 405915-88-0, Cobalt lithium tin phosphate
(Co0.5-1LiSn0-0.5(P04)) 405915-90-4, Barium cobalt lithium phosphate
(Ba0-0.5Co0.5-1Li(P04)) 405915-92-6, Barium cobalt lithium phosphate
(Ba0-0.2Co0.8-1Li(P04)) 405915-94-8, Beryllium cobalt lithium phosphate
(Be0-0.5Co0.5-1Li(P04)) 405915-96-0, Beryllium cobalt lithium phosphate
(Be0-0.2Co0.8-1Li(P04))

RL: DEV (Device component use); USES (Uses)

(lithium-based cathode active materials for rechargeable lithium battery and prepn. thereof)

- IT 204653-30-5P, Lithium vanadium phosphate Li3V2(P04)3 349632-76-4P, Iron
lithium magnesium phosphate (Fe0.9LiMg0.1(P04)) **349632-79-7P**,
Calcium iron lithium phosphate (Ca0.1Fe0.9Li(P04)) 349632-82-2P, Iron
lithium zinc phosphate (Fe0.9LiZn0.1(P04))

RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)

(lithium-based cathode active materials for rechargeable lithium battery and prepn. thereof)

L4 ANSWER 2 OF 5 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 2002:256645 CAPLUS

DOCUMENT NUMBER: 136:297382

TITLE: Carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes

INVENTOR(S): Armand, Michel; Gauthier, Michel; Magnan, Jean-Francois; Ravet, Nathalie

PATENT ASSIGNEE(S): Hydro-Quebec, Can.

SOURCE: PCT Int. Appl., 78 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: French

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002027824	A1	20020404	WO 2001-CA1350	20010921
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2001093569	A5	20020408	AU 2001-93569	20010921
PRIORITY APPLN. INFO.: CA 2000-2320661 A 20000926				
WO 2001-CA1350 W 20010921				
AB Carbon-coated redox materials suitable for use in battery electrodes consist of a core surrounded by a coating, or interconnected by carbon crosslinks, in which the core includes a compn. of formula $LixM1-yM'y(XO4)n$, in which $y = 0-0.6$, $x = 0-2$, $n = 0-1.5$; M is a transition metal; and M' is a element of fixed valence selected from Mg^{2+} , Ca^{2+} , Al^{3+} , and Zn^{2+} , and X is S, P, and Si. Synthesis of the materials is carried out by reacting a balanced mixt. of appropriate precursors in a reducing atm., to adjust the valence of the transition metals, in the presence of a carbon source, which is then pyrolyzed. The resulting products exhibit an excellent elec. cond. and a highly enhanced chem. activity.				
IT Silanes				
RL: RCT (Reactant); RACT (Reactant or reagent) (alkoxy, silicon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)				
IT Polyoxaalkylenes, uses				
RL: NUU (Other use, unclassified); USES (Uses)				

- (alkyl ethers, oligomeric, aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT Fluoropolymers, uses
Polyesters, uses
Polyethers, uses
RL: NUU (Other use, unclassified); USES (Uses)
(binders; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT Battery cathodes
Battery electrodes
Redox agents
(carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT Transition metals, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(electrodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 78-93-3, Methyl ethyl ketone, uses 96-48-0, Butyrolactone 96-49-1, Ethylene carbonate 107-21-1D, Ethylene glycol, alkyl ethers 108-32-7, Propylene carbonate 111-46-6D, Diethylene glycol, alkyl ethers 112-27-6D, Triethylene glycol, alkyl ethers 112-60-7D, Tetraethylene glycol, alkyl ethers 463-79-6D, Carbonic acid, C1-4-alkyl esters
RL: NUU (Other use, unclassified); USES (Uses)
(aprotic solvent; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 9011-14-7, Poly(methyl methacrylate) 24937-79-9, Poly(vinylidene difluoride) 25014-41-9, Polyacrylonitrile
RL: NUU (Other use, unclassified); USES (Uses)
(binders; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 50-99-7, Glucose, reactions 57-48-7, Fructose, reactions 57-50-1, Sucrose, reactions 58-86-6, Xylose, reactions 87-79-6, Sorbose 9002-88-4, Polyethylene 9003-07-0, Polypropylene 9004-34-6, Cellulose, reactions 9004-34-6D, Cellulose, esters 9004-35-7, Cellulose acetate 9005-25-8, Starch, reactions 25212-86-6, Poly(furfuryl alcohol) 43094-71-9, Ethylene-ethylene oxide copolymer
RL: RCT (Reactant); RACT (Reactant or reagent)
(carbon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 407640-63-5, Iron lithium titanium phosphate sulfate (Fe_{0.85}Li_{1.35}Ti_{0.15}(PO₄)_{0.5}(SO₄))
RL: DEV (Device component use); USES (Uses)
(electrodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 7439-89-6D, Iron, mixed oxides 7439-96-5D, Manganese, mixed oxides 7440-02-0D, Nickel, mixed oxides 7440-32-6D, Titanium, mixed oxides 7440-47-3D, Chromium, mixed oxides 7440-48-4D, Cobalt, mixed oxides 7440-50-8D, Copper, mixed oxides 7440-62-2D, Vanadium, mixed oxides 13816-45-0, Triphylite 15365-14-7, Iron lithium phosphate (FeLiPO₄)

- 213467-46-0, Iron lithium manganese phosphate ($\text{FeLi}_2\text{Mn}(\text{PO}_4)_2$)
RL: TEM (Technical or engineered material use); USES (Uses)
(electrodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 90076-65-6
RL: NUU (Other use, unclassified); USES (Uses)
(electrolyte contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 516-03-0, Ferrous oxalate
RL: RCT (Reactant); RACT (Reactant or reagent)
(iron source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 7429-90-5, Aluminum, uses 7440-31-5, Tin, uses 7440-36-0, Antimony, uses 7440-66-6, Zinc, uses 7782-42-5, Graphite, uses 39302-37-9, Lithium titanate 207803-50-7, Aluminum cobalt lithium magnesium nickel oxide 258511-24-9, Iron lithium nitride 263898-18-6, Cobalt manganese nitride 407640-62-4
RL: DEV (Device component use); USES (Uses)
(lithium-based cathodes contg.; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 638-38-0, Manganese(II) acetate
RL: RCT (Reactant); RACT (Reactant or reagent)
(manganese source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 546-89-4, Lithium acetate 553-91-3, Lithium oxalate 554-13-2, Lithium carbonate 1309-37-1, Ferric oxide, reactions 1310-65-2, Lithium hydroxide 1313-13-9, Manganese dioxide, reactions 1314-62-1, Vanadium pentoxide, reactions 1317-61-9, Magnetite, reactions 10045-86-0, Ferric phosphate 10102-24-6, Lithium silicate (Li_2SiO_3) 10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate (Li_3PO_4) 10421-48-4, Ferric nitrate 12057-24-8, Lithium oxide, reactions 12627-14-4 13453-80-0, Lithium dihydrogen phosphate 63985-45-5, Lithium orthosilicate 407640-52-2, Iron lithium manganese phosphate ($\text{Fe}_{0.1}\text{LiMn}_{0.9}(\text{PO}_4)$) 407640-53-3, Iron lithium magnesium phosphate ($\text{Fe}_{0.7}\text{LiMg}_{0.3}(\text{PO}_4)$) **407640-54-4**, Calcium iron lithium phosphate ($\text{Ca}_{0.3}\text{Fe}_{0.7}\text{Li}(\text{PO}_4)$) 407640-55-5 407640-56-6, Iron lithium phosphate silicate ($\text{FeLi}_{1-1.9}(\text{PO}_4)_{0.1-1}(\text{SiO}_4)_{0-0.9}$) 407640-57-7 407640-58-8, Iron lithium manganese phosphate sulfate ($\text{Fe}_{0.1}\text{Li}_{1-1.2}\text{Mn}_{0-0.2}[(\text{PO}_4)(\text{SO}_4)]$) 407640-59-9, Iron lithium manganese phosphate ((Fe,Mn) $\text{Li}_{1-1.6}(\text{PO}_4)$) 407640-60-2, Iron lithium manganese phosphate sulfate ($\text{Fe}_{1-2}\text{Li}_{1-2}\text{Mn}_{0-1}[(\text{PO}_4)(\text{SO}_4)]$) 407640-61-3, Iron lithium titanium phosphate ((Fe,Ti) $\text{Li}_{0.5-2}(\text{PO}_4)_{1.5}$)
RL: RCT (Reactant); RACT (Reactant or reagent)
(metal source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)
- IT 25322-68-3D, Polyethylene glycol, alkyl ethers
RL: NUU (Other use, unclassified); USES (Uses)
(oligomeric, aprotic solvent; carbon-coated or carbon-crosslinked redox

materials with transition metal-lithium oxide core for use as battery electrodes)

IT 7664-38-2, Phosphoric acid, reactions 7664-38-2D, Phosphoric acid, esters 7783-28-0, Ammonium hydrogen phosphate 10124-54-6, Manganese phosphate
RL: RCT (Reactant); RACT (Reactant or reagent)
(phosphorus source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)

IT 7631-86-9, Silica, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(silicon source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)

IT 7664-93-9, Sulfuric acid, reactions 7783-20-2, Ammonium sulfate, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(sulfur source; carbon-coated or carbon-crosslinked redox materials with transition metal-lithium oxide core for use as battery electrodes)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L4 ANSWER 3 OF 5 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2001:796594 CAPLUS
DOCUMENT NUMBER: 135:333335
TITLE: Cathode active mass and batteries thereof
INVENTOR(S): Katayama, Sadahiro; Inamasu, Norio
PATENT ASSIGNEE(S): Yuasa Corporation, Japan
SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DOCUMENT TYPE: Patent
LANGUAGE: Japanese
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001307726	A2	20011102	JP 2000-122550	20000424

PRIORITY APPLN. INFO.: JP 2000-122550 20000424

AB The cathode active mass is $\text{LiFe}_{1-x}\text{M}_x\text{PO}_4$, where M = Mg, Ca, Sr, Ba, Sc, Y, Zn, Al, Ga, In, Si, and/or rare earth element and $0 < x < 0.5$. Batteries using the active mass are secondary Li batteries.

IT Battery cathodes
(compos. of substituted iron lithium phosphates for cathodes in secondary lithium batteries)

IT Rare earth metals, uses
RL: MOA (Modifier or additive use); USES (Uses)
(substituents in iron lithium phosphates for cathodes in secondary lithium batteries)

IT 349632-79-7, Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{LiPO}_4$)
369596-75-8, Iron lithium strontium phosphate ($\text{Fe}_{0.9}\text{LiSr}_{0.1}(\text{PO}_4)$)
369596-76-9

RL: DEV (Device component use); USES (Uses)

(comprns. of substituted iron lithium phosphates for cathodes in secondary lithium batteries)

IT 7440-20-2, Scandium, uses 7440-21-3, Silicon, uses 7440-39-3, Barium, uses 7440-55-3, Gallium, uses 7440-65-5, Yttrium, uses 7440-66-6, Zinc, uses 7440-74-6, Indium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(substituents in iron lithium phosphates for cathodes in secondary lithium batteries)

L4 ANSWER 4 OF 5 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 2001:546025 CAPLUS

DOCUMENT NUMBER: 135:109741

TITLE: Preparation of lithium-based electrochemically active materials for lithium batteries

INVENTOR(S): Barker, Jeremy; Saidi, M. Yazid

PATENT ASSIGNEE(S): Valence Technology, Inc., USA

SOURCE: PCT Int. Appl., 97 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001054212	A1	20010726	WO 2000-US35302	20001222

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

EP 1252671	A1	20021030	EP 2000-993800	20001222
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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR

US 2002039687	A1	20020404	US 2001-908480	20010718
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PRIORITY APPLN. INFO.: US 2000-484799 A1 20000118

WO 2000-US35302 W 20001222

AB The invention provides novel lithium-mixed metal materials which, upon electrochem. interaction, release lithium ions, and are capable of reversibly cycling lithium ions. The invention provides a rechargeable lithium battery which comprises an electrode formed from the novel lithium-mixed metal materials. Methods for making the novel lithium-mixed metal materials and methods for using such lithium-mixed metal materials in electrochem. cells are also provided. The lithium-mixed metal materials comprise lithium and at least one other metal besides lithium.

Preferred materials are lithium-mixed metal phosphates which contain lithium and two other metals besides lithium.

IT Secondary batteries
(lithium; prepn. of lithium-based electrochem. active materials for lithium batteries)

IT Battery cathodes
(prepn. of lithium-based electrochem. active materials for lithium batteries)

IT Carbon black, uses
RL: MOA (Modifier or additive use); USES (Uses)
(prepn. of lithium-based electrochem. active materials for lithium batteries)

IT EPDM rubber
RL: TEM (Technical or engineered material use); USES (Uses)
(prepn. of lithium-based electrochem. active materials for lithium batteries)

IT 96-49-1, Ethylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 12162-92-4, lithium vanadium oxide LiV_2O_5 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(prepn. of lithium-based electrochem. active materials for lithium batteries)

IT 331622-65-2P, Iron lithium zinc phosphate ($\text{Fe}_{0.8}\text{LiZn}_{0.2}(\text{PO}_4)$)
349632-76-4P, Iron lithium magnesium phosphate ($\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4)$)
349632-79-7P, Calcium iron lithium phosphate ($\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4)$)
349632-82-2P, Iron lithium zinc phosphate ($\text{Fe}_{0.9}\text{LiZn}_{0.1}(\text{PO}_4)$)
349632-85-5P **349632-88-8P**
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(prepn. of lithium-based electrochem. active materials for lithium batteries)

IT 554-13-2, Lithium carbonate 1305-62-0, Calcium hydroxide, reactions 1309-37-1, Ferric oxide, reactions 1309-42-8, Magnesium hydroxide 7440-44-0, Carbon, reactions 7779-90-0, Zinc phosphate 7783-28-0, Diammonium hydrogen phosphate 10045-86-0, iron phosphate FePO_4 13453-80-0, Lithium dihydrogen phosphate 14940-41-1, Iron phosphate $\text{Fe}_3(\text{PO}_4)_2$
RL: RCT (Reactant); RACT (Reactant or reagent)
(prepn. of lithium-based electrochem. active materials for lithium batteries)

IT 15365-14-7P, iron lithium phosphate FeLiPO_4 204653-30-5P, Lithium vanadium phosphate $\text{Li}_3\text{V}_2(\text{PO}_4)_3$
RL: SPN (Synthetic preparation); PREP (Preparation)
(prepn. of lithium-based electrochem. active materials for lithium batteries)

REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

DOCUMENT NUMBER: 135:109740
 TITLE: Preparation of lithium-containing materials for battery cathodes
 INVENTOR(S): Barker, Jeremy; Saidi, M. Yazid; Swoyer, Jeffrey L.
 PATENT ASSIGNEE(S): Valence Technology, Inc., USA
 SOURCE: PCT Int. Appl., 94 pp.
 CODEN: PIXXD2
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001053198	A1	20010726	WO 2000-US35438	20001222
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
EP 1252093	A1	20021030	EP 2000-989532	20001222
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
US 2002086214	A1	20020704	US 2001-1376	20011019
PRIORITY APPLN. INFO.: US 2000-484919 A1 20000118				
WO 2000-US35438 W 20001222				
AB	The invention provides novel lithium-mixed metal materials which, upon electrochem. interaction, release lithium ions, and are capable of reversibly cycling lithium ions. The invention provides a rechargeable lithium battery which comprises an electrode formed from the novel lithium-mixed metal materials. Methods for making the novel lithium-mixed metal materials and methods for using such lithium-mixed metal materials in electrochem. cells are also provided. The lithium-mixed metal materials comprise lithium and at least one other metal besides lithium. Preferred materials are lithium-mixed metal phosphates which contain lithium and two other metals besides lithium.			
IT	Reduction (carbothermic; prepn. of lithium-contg. materials for battery cathodes)			
IT	Secondary batteries (lithium; prepn. of lithium-contg. materials for battery cathodes)			
IT	Battery cathodes (prepn. of lithium-contg. materials for battery cathodes)			
IT	12162-92-4P, lithium vanadium oxide LiV_2O_5 204653-30-5P, Lithium vanadium phosphate $\text{Li}_3\text{V}_2(\text{PO}_4)_3$ 349632-76-4P, Iron lithium magnesium phosphate $(\text{Fe}_{0.9}\text{LiMg}_{0.1}(\text{PO}_4))$ 349632-79-7P , Calcium iron lithium phosphate $(\text{Ca}_{0.1}\text{Fe}_{0.9}\text{Li}(\text{PO}_4))$ 349632-82-2P, Iron lithium zinc phosphate			

(Fe_{0.9}LiZn_{0.1}(PO₄))

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(prepn. of lithium-contg. materials for battery cathodes)

IT 546-89-4, Lithium acetate 553-91-3, Lithium oxalate 554-13-2, Lithium carbonate 1305-62-0, Calcium hydroxide, reactions 1309-37-1, Ferric oxide, reactions 1309-42-8, Magnesium hydroxide 1314-62-1, Vanadium pentoxide, reactions 1317-61-9, iron oxide fe₃o₄, reactions 7440-44-0, Carbon, reactions 7722-76-1, Ammonium dihydrogen phosphate 7783-28-0, Diammonium hydrogen phosphate 7790-69-4, Lithium nitrate 7803-55-6, Ammonium vanadate 10045-86-0, iron phosphate fepo₄ 10377-52-3, Lithium phosphate 11126-15-1, Lithium vanadium oxide 12036-21-4, Vanadium dioxide 12057-24-8, Lithia, reactions 13453-80-0, Lithium dihydrogen phosphate 15060-59-0, lithium vanadium oxide livo₃

RL: RCT (Reactant); RACT (Reactant or reagent)

(prepn. of lithium-contg. materials for battery cathodes)

IT 15365-14-7P, iron lithium phosphate FeLiPO₄

RL: SPN (Synthetic preparation); PREP (Preparation)

(prepn. of lithium-contg. materials for battery cathodes)

REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

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YOU HAVE REQUESTED DATA FROM 9 ANSWERS - CONTINUE? Y/(N):y

L3 ANSWER 1 OF 9 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 2002:291865 CAPLUS

DOCUMENT NUMBER: 136:312584

TITLE: Method for preparation of cathode active material for nonaqueous lithium secondary battery

INVENTOR(S): Sato, Atsushi; Kuyama, Junji; Fukushima, Yuzuru; Hosoya, Mamoru

PATENT ASSIGNEE(S): Sony Corp., Japan

SOURCE: Eur. Pat. Appl., 15 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----
EP 1198019	A2	20020417	EP 2001-123899	20011005
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002117847	A2	20020419	JP 2000-308299	20001006
CN 1348226	A	20020508	CN 2001-130348	20010930
US 2002106562	A1	20020808	US 2001-970573	20011004
PRIORITY APPLN. INFO.:		JP 2000-308299 A 20001006		
AB	A nonaq. electrolyte cell includes a cathode contg. a cathode active material, which is mainly composed of a compd. represented by the general formula Li_xFePO_4 , where $0 < x \leq 1$, with the molar ratio of Li_3PO_4 to a compd. represented by the general formula Li_xFePO_4 , which ratio is represented by $\text{Li}_3\text{PO}_4/\text{LiFePO}_4$, being $\text{Li}_3\text{PO}_4/\text{LiFePO}_4 \leq 6.67$ times. 10-2. Starting materials for the synthesis of compd. Li_xFePO_4 where $0 < x \leq 1$ are Li_3PO_4 and $\text{Fe}_3(\text{PO}_4)_2$ or $\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$ when n denotes a no. of hydrates.			
IT	Secondary batteries (lithium; method for prepn. of cathode active material for nonaq. lithium secondary battery)			
IT	Battery cathodes Battery electrolytes (method for prepn. of cathode active material for nonaq. lithium secondary battery)			
IT	Fluoropolymers, uses RL: MOA (Modifier or additive use); USES (Uses) (method for prepn. of cathode active material for nonaq. lithium secondary battery)			
IT	10028-23-6, Phosphoric acid, iron(2+) salt (2:3)octahydrate 10377-52-3.			

Trilithium phosphate 14940-41-1, Iron phosphate $\text{Fe}_3(\text{PO}_4)_2$ 31096-55-6,
Phosphoric acid, iron(2+) salt (2:3) hydrate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical
process); PROC (Process)
(method for prepn. of cathode active material for nonaq. lithium
secondary battery)
IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7782-42-5,
Graphite, uses 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(method for prepn. of cathode active material for nonaq. lithium
secondary battery)
IT **198782-39-7P**, Iron lithium phosphate ($\text{FeLiO} \cdot \text{P}_2\text{O}_7$)
RL: DEV (Device component use); SPN (Synthetic preparation); PREP
(Preparation); USES (Uses)
(method for prepn. of cathode active material for nonaq. lithium
secondary battery)
IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9,
Pvdf
RL: MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. lithium
secondary battery)

L3 ANSWER 2 OF 9 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 2002:272909 CAPLUS

DOCUMENT NUMBER: 136:297395

TITLE: Method for fabrication of cathode active material and
a nonaqueous electrolyte battery

INVENTOR(S): Hosoya, Mamoru; Fukushima, Yuzuru; Sakai, Hidecki;
Kuyama, Junji

PATENT ASSIGNEE(S): Sony Corporation, Japan

SOURCE: Eur. Pat. Appl., 31 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1195827	A2	20020410	EP 2001-123894	20011005
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002117848	A2	20020419	JP 2000-308300	20001006
JP 2002117849	A2	20020419	JP 2000-308313	20001006
US 2002124386	A1	20020912	US 2001-966918	20010928
CN 1360353	A	20020724	CN 2001-138169	20010930
PRIORITY APPLN. INFO.:			JP 2000-308300	A 20001006
			JP 2000-308313	A 20001006

AB The invention comprises a method for producing a cathode active material
having superior cell characteristics through single-phase synthesis of a

composite material composed of a compd. represented by the general formula $\text{Li}_x\text{Fe}_{1-y}\text{MyPO}_4$ and a carbon material pos. and a method for producing a non-aq. electrolyte cell employing the so produced cathode active material. To this end, the cathode active material is prep'd. by a step of mixing the starting materials for synthesis of the compd. represented by the general formula $\text{Li}_x\text{Fe}_{1-y}\text{MyPO}_4$, a step of milling a mixt. obtained by the mixing step, a step of compressing the mixt. obtained by the mixing step to a preset d. and a step of sintering the mixt. obtained by the compressing step. A carbon material is added in any one of the above steps prior to the sintering step. The d. of the mixt. in the compressing step is set to not less than 1.71 g/cm³ and not larger than 2.45 g/cm³.

IT Ball milling

Battery cathodes

Composites

Secondary batteries

(method for fabrication of cathode active material and nonaq. electrolyte battery)

IT Carbon black, uses

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

(method for fabrication of cathode active material and nonaq. electrolyte battery)

IT 7440-44-0, Carbon, uses **198782-39-7**, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$) 407606-22-8, Chromium iron lithium phosphate ($\text{CrO-0.8FeO.2-1LiO.05-1.2(PO}_4\text{)}$) 407606-24-0, Cobalt iron lithium phosphate ($\text{CoO-0.8FeO.2-1LiO.05-1.2(PO}_4\text{)}$) 407606-26-2, Copper iron lithium phosphate ($\text{CuO-0.8FeO.2-1LiO.05-1.2(PO}_4\text{)}$) 407606-28-4, Aluminum iron lithium phosphate ($\text{AlO-0.8FeO.2-1LiO.05-1.2(PO}_4\text{)}$) 407606-30-8, Gallium iron lithium phosphate ($\text{GaO-0.8FeO.2-1LiO.05-1.2(PO}_4\text{)}$) 407606-32-0, Boron iron lithium phosphate ($\text{BO-0.8FeO.2-1LiO.05-1.2(PO}_4\text{)}$) 407606-34-2, Iron lithium manganese phosphate ($\text{FeO.2-1LiO.05-1.2MnO-0.8(PO}_4\text{)}$) 407606-36-4, Iron lithium nickel phosphate ($\text{FeO.2-1LiO.05-1.2NiO-0.8(PO}_4\text{)}$) 407606-39-7, Iron lithium vanadium phosphate ($\text{FeO.2-1LiO.05-1.2VO-0.8(PO}_4\text{)}$) 407606-42-2, Iron lithium molybdenum phosphate ($\text{FeO.2-1LiO.05-1.2MoO-0.8(PO}_4\text{)}$) 407606-44-4, Iron lithium titanium phosphate ($\text{FeO.2-1LiO.05-1.2TiO-0.8(PO}_4\text{)}$) 407606-47-7, Iron lithium zinc phosphate ($\text{FeO.2-1LiO.05-1.2ZnO-0.8(PO}_4\text{)}$) 407606-49-9, Iron lithium magnesium phosphate ($\text{FeO.2-1LiO.05-1.2MgO-0.8(PO}_4\text{)}$) 407606-51-3, Iron lithium niobium phosphate ($\text{FeO.2-1LiO.05-1.2NbO-0.8(PO}_4\text{)}$) 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-10-8 407630-14-2

RL: DEV (Device component use); USES (Uses)

(method for fabrication of cathode active material and nonaq. electrolyte battery)

IT 15365-14-7P, Iron lithium phosphate FeLiPO_4

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(method for fabrication of cathode active material and nonaq. electrolyte battery)

IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer

RL: MOA (Modifier or additive use); USES (Uses)
(method for fabrication of cathode active material and nonaq.
electrolyte battery)

L3 ANSWER 3 OF 9 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2002:253129 CAPLUS
DOCUMENT NUMBER: 136:281939
TITLE: Nonaqueous electrolyte battery cathode active material
capable of reversibly doping/undoping lithium
INVENTOR(S): Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru
PATENT ASSIGNEE(S): Sony Corporation, Japan
SOURCE: Eur. Pat. Appl., 16 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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EP 1193787	A2	20020403	EP 2001-123181	20010927
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002110161	A2	20020412	JP 2000-301399	20000929
US 2002114754	A1	20020822	US 2001-961895	20010924
CN 1350341	A	20020522	CN 2001-142556	20010929
PRIORITY APPLN. INFO.:		JP 2000-301399 A 20000929		
AB	An LiFePO ₄ carbon composite material is to be synthesized in a single phase to realize superior cell characteristics. To this end, in the prepn. of a cathode active material, starting materials for synthesis of a compd. having the formula Li _x FePO ₄ , where 0 < x ≤ 1, are mixed together, milled and sintered. A carbon material is added at one of these steps. As the starting materials for synthesis for Li _x FePO ₄ , Li ₃ PO ₄ , Fe ₃ PO ₄ , Fe ₃ (PO ₄) ₂ or its hydrate Fe ₃ (PO ₄) ₂ ·nH ₂ O, where n is the no. of hydrates, are used, and the content of Fe ³⁺ in the total iron in Fe ₃ (PO ₄) ₂ or its hydrate Fe ₃ (PO ₄) ₂ ·nH ₂ O is set to 61 wt% or less.			
IT	Secondary batteries (lithium; nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)			
IT	Ball milling Battery cathodes Composites Sintering (nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)			
IT	Carbonaceous materials (technological products) RL: DEV (Device component use); USES (Uses) (nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)			
IT	Fluoropolymers, uses			

- RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
- IT 10028-23-6, Phosphoric acid, iron(2+) salt (2:3) octahydrate 10045-86-0, Ferric phosphate 10377-52-3, Lithium phosphate Li_3PO_4 31096-55-6
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7782-42-5, Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 15365-14-7, Iron lithium phosphate FeLiPO_4 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
- IT 24937-79-9, PvdF
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
- IT 198782-39-7P, Iron lithium phosphate (FeLiO-1(P04))
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
- IT 872-36-6, Vinylene carbonate
RL: MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)

L3 ANSWER 4 OF 9 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2002:253128 CAPLUS
DOCUMENT NUMBER: 136:281938
TITLE: Nonaqueous electrolyte battery cathode active material capable of reversibly doping/undoping lithium
INVENTOR(S): Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru
PATENT ASSIGNEE(S): Sony Corporation, Japan
SOURCE: Eur. Pat. Appl.. 15 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1193786	A2	20020403	EP 2001-123180	20010927
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT,				

IE, SI, LT, LV, FI, RO
JP 2002110163 A2 20020412 JP 2000-301401 20000929
US 2002061274 A1 20020523 US 2001-965273 20010927
CN 1349265 A 20020515 CN 2001-142532 20010929
PRIORITY APPLN. INFO.: JP 2000-301401 A 20000929
AB A LiFePO₄ carbon composite material is to be synthesized in a single phase satisfactorily to achieve superior cell characteristics. In prepg. a cathode active material, starting materials for synthesis of a compd. represented by the general formula Li_xFePO₄, where 0 < x ≤ 1, are mixed, milled and a carbon material is added to the resulting mass at an optional time point in the course of mixing, milling and sintering. Li₃PO₄, Fe₃(PO₄)₂ or its hydrates Fe₃(PO₄)₂·nH₂O, where n denotes the no. of hydrates, are used as the starting materials for synthesis of Li_xFePO₄. The temp. of a product from the sintering is set to 305.degree. or less when the product from the sintering is exposed to atm. The oxygen concn. in a sintering atm. is set to 1012 ppm in vol. or less at the time point of sintering.
IT Secondary batteries
(lithium; nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
IT Battery cathodes
Composites
Sintering
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
IT Carbon black, uses
Carbonaceous materials (technological products)
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
IT Fluoropolymers, uses
RL: MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
IT Ball milling
(planetary; nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
IT 10028-23-6. Phosphoric acid, iron(2+) salt (2:3) octahydrate 10377-52-3, Lithium phosphate 14940-41-1, Iron phosphate fe₃(po₄)₂ 31096-55-6
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)

- IT 872-36-6, Vinylene carbonate 7440-44-0, Carbon, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, Poly(vinylidene fluoride)
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
- IT 15365-14-7P, Iron lithium phosphate felipo4 **198782-39-7P**, Iron lithium phosphate (FeLiO-1(P04))
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)
- IT 7782-44-7, Oxygen, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(nonaq. electrolyte battery cathode active material capable of reversibly doping/undoping lithium)

L3 ANSWER 5 OF 9 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 2002:253127 CAPLUS

DOCUMENT NUMBER: 136:281937

TITLE: Nonaqueous electrolyte battery with cathode active material capable of reversibly doping/undoping lithium

INVENTOR(S): Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru

PATENT ASSIGNEE(S): Sony Corporation, Japan

SOURCE: Eur. Pat. Appl., 16 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1193785	A2	20020403	EP 2001-122769	20010921
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002110164	A2	20020412	JP 2000-301402	20000929
US 2002059719	A1	20020523	US 2001-956514	20010919
CN 1346159	A	20020424	CN 2001-138523	20010928

PRIORITY APPLN. INFO.: JP 2000-301402 A 20000929

AB A LiFePO₄ carbon composite material is to be synthesized in a single phase satisfactorily to prevent the deterioration of the performance of the cathode active material from occurring and achieve superior cell characteristics. In prepg. a cathode active material, starting materials for synthesis of a compd. represented by the general formula Li_xFePO₄, where 0 < x ≤ 1, are mixed, milled and a carbon material is added to the resulting mass at an optional time point in the course of mixing, milling and sintering. Li₃PO₄, Fe₃(PO₄)₂ or its hydrates Fe₃(PO₄)₂·nH₂O, where n denotes the no. of hydrates, are used as

the starting materials for synthesis of $\text{Li}_x\text{FeP}_2\text{O}_4$. The temp. of a product from the sintering is set to 305.degree. or less when the product from the sintering is exposed to atm.

- IT Secondary batteries
(lithium; nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT Battery cathodes
Composites
(nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT Carbonaceous materials (technological products)
RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT Fluoropolymers, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT Ball milling
(planetary; nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT 10377-52-3, Lithium phosphate Li_3PO_4 14940-41-1, Iron phosphate $\text{Fe}_3(\text{PO}_4)_2$ 31096-55-6
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 872-36-6, Vinylene carbonate 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT 7440-44-0, Carbon, uses 24937-79-9, PvdF
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)
- IT 15365-14-7P, Iron lithium phosphate FeLiPO_4 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(P}_2\text{O}_7)$)
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(nonaq. electrolyte battery with cathode active material capable of reversibly doping/undoping lithium)

TITLE: Method for the preparation of cathode active material
for a nonaqueous electrolyte battery
INVENTOR(S): Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru
PATENT ASSIGNEE(S): Sony Corporation, Japan
SOURCE: Eur. Pat. Appl., 16 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1193784	A2	20020403	EP 2001-122752	20010921
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002110165	A2	20020412	JP 2000-301403	20000929
US 2002041998	A1	20020411	US 2001-961863	20010924
CN 1349264	A	20020515	CN 2001-142531	20010929
PRIORITY APPLN. INFO.:		JP 2000-301403 A 20000929		

AB A LiFePO₄ carbon composite material is to be synthesized in a single phase satisfactorily to achieve superior cell characteristics. In prepg. a cathode active material, a starting material for synthesis of a compd. represented by the general formula Li_xFePO₄, where 0<.times..ltoreq.1, is mixed, milled and sintered and a carbon material is added to the resulting mass at an optional time point in the course of mixing, milling and sintering. Li₃PO₄, Fe₃(PO₄)₂ or its hydrates Fe₃(PO₄)₂.cntdot.nH₂O, where n denotes the no. of hydrates, are used as the starting material for synthesis of Li_xFePO₄. The particle size distribution of particles of the starting material for synthesis following the milling with the particle size not less than 3 .mu.m is set to 2.2% or less in terms of the volumetric integration frequency.

IT Secondary batteries
(lithium; method for prepn. of cathode active material for nonaq. electrolyte battery)

IT Battery cathodes
Particle size distribution
(method for prepn. of cathode active material for nonaq. electrolyte battery)

IT Carbon black, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)

IT Ball milling
(planetary; method for prepn. of cathode active material for nonaq. electrolyte battery)

IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 21324-40-3, Lithium hexafluorophosphate

RL: DEV (Device component use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)

IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)

IT 15365-14-7P, Iron lithium phosphate FeLiPO_4 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)

L3 ANSWER 7 OF 9 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2002:253125 CAPLUS
DOCUMENT NUMBER: 136:265825
TITLE: Method for the preparation of cathode active material for a nonaqueous electrolyte battery
INVENTOR(S): Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru
PATENT ASSIGNEE(S): Sony Corporation, Japan
SOURCE: Eur. Pat. Appl., 20 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1193783	A2	20020403	EP 2001-122751	20010921
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002110162	A2	20020412	JP 2000-301400	20000929
US 2002102459	A1	20020801	US 2001-961862	20010924
CN 1346162	A	20020424	CN 2001-137901	20010929
PRIORITY APPLN. INFO.:		JP 2000-301400 A 20000929		

AB A nonaq. electrolyte cell is disclosed having superior electronic cond. and superior cell characteristics. A cathode active material used for the cell is a composite material of a compd. having the formula Li_xFePO_4 , where $0 < x \leq 1.0$, and a carbon material, wherein the sp. surface area as found by the Brunauer Emmet Teller formula is not less than 10.3 m²/g.

IT Secondary batteries
(lithium; method for prepn. of cathode active material for nonaq. electrolyte battery)

IT Battery cathodes
Surface area
(method for prepn. of cathode active material for nonaq. electrolyte battery)

- IT Carbon black, uses
Carbonaceous materials (technological products)
RL: DEV (Device component use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT Fluoropolymers, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 24937-79-9, PvdF
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 15365-14-7P, Iron lithium phosphate FeLiPO_4 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-l(PO}_4\text{)}$)
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)

L3 ANSWER 8 OF 9 CAPLUS COPYRIGHT 2003 ACS
ACCESSION NUMBER: 2002:169249 CAPLUS
DOCUMENT NUMBER: 136:203096
TITLE: Method for preparation of cathode active material for nonaqueous electrolyte battery
INVENTOR(S): Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru
PATENT ASSIGNEE(S): Sony Corporation, Japan
SOURCE: Eur. Pat. Appl., 21 pp.
CODEN: EPXXDW
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1184920	A2	20020306	EP 2001-120637	20010830
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2002075364	A2	20020315	JP 2000-261277	20000830
CN 1340869	A	20020320	CN 2001-135562	20010830
PRIORITY APPLN. INFO.:			JP 2000-261277	A 20000830

- AB A cathode active material improved in electron cond. and a non-aq. electrolyte cell employing this cathode active material and which is improved in cell capacity and cyclic characteristics are disclosed. The cathode active material is composed of a compd. having the general formula Li_xFePO_4 where $0 < x \leq 1.0$, and a carbon material, with the carbon content per unit wt. being not less than 3 wt% and with the powder d. being not lower than 2.2 g/cm³.
- IT Secondary batteries
(lithium; method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT Battery cathodes
Sintering
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT Carbonaceous materials (technological products)
Fluoropolymers, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT Carbon black, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 10045-86-0, Phosphoric acid, iron(3+) salt (1:1) 10377-52-3, Lithium phosphate
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 24937-79-9, PvdF
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 15365-14-7P, Iron lithium phosphate FeLiPO_4 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)
- IT 7440-44-0, Carbon, uses
RL: MOA (Modifier or additive use); USES (Uses)
(method for prepn. of cathode active material for nonaq. electrolyte battery)

battery)

L3 ANSWER 9 OF 9 CAPLUS COPYRIGHT 2003 ACS

ACCESSION NUMBER: 1997:718093 CAPLUS

DOCUMENT NUMBER: 128:5716

TITLE: Cathode materials for secondary alkali metal-ion and lithium-ion batteries

INVENTOR(S): Goodenough, John B.; Padhi, Akshaya; Nanjundaswamy, K. S.; Masquelier, Christian

PATENT ASSIGNEE(S): Board of Regents, the University of Texas System, USA

SOURCE: PCT Int. Appl., 47 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9740541	A1	19971030	WO 1997-US6671	19970423
W: CA, JP				
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
EP 904607	A1	19990331	EP 1997-923437	19970423
R: DE, FR, GB, IT				
JP 2000509193	T2	20000718	JP 1997-538259	19970423
PRIORITY APPLN. INFO.:			US 1996-16060P	P 19960423
			US 1996-32346P	P 19961204
			WO 1997-US6671	W 19970423

AB The cathode materials are LiMP_2O_4 , where M is a first-row transition-metal cation; Mn, Fe, Co, and/or Ni; or $\text{Fe}_{1-x}\text{Mn}_x$ or $\text{Fe}_{1-x}\text{Ti}_x$, where $0 < x < 1$. The cathode materials comprise a rhombohedral Nasicon material $\text{M}_1\text{xM}_2(\text{PO}_4)_3$, where M_1 is Li or Na and $x \leq 0.5$.

IT Battery cathodes
(materials for secondary alkali metal-ion and lithium-ion)

IT 36058-25-0P, Iron lithium phosphate ($\text{Fe}_2\text{Li}_3(\text{PO}_4)_3$) 184241-62-1P
196612-05-2P, Iron lithium niobium phosphate ($\text{FeLiNb}(\text{PO}_4)_3$)
198782-43-3P, Lithium vanadium phosphate ($\text{LiV}_2(\text{PO}_4)_3$)
RL: DEV (Device component use); PNU (Preparation, unclassified); PRP (Properties); PREP (Preparation); USES (Uses)
(cathode materials for secondary lithium-ion batteries)

IT 15365-14-7, Iron lithium phosphate (LiFePO_4) 196612-01-8, Lithium sodium vanadium phosphate ($\text{Li}_2\text{NaV}_2(\text{PO}_4)_3$) 198782-39-7, Iron lithium phosphate ($\text{FeLi}_{0.5}(\text{PO}_4)$) 198782-41-1, Iron lithium phosphate ($\text{Fe}_2\text{Li}_3\text{-}5(\text{PO}_4)_3$) 198782-42-2, Iron lithium phosphate sulfate ($\text{Fe}_2\text{Li}_{1.5}(\text{PO}_4)(\text{SO}_4)_2$)
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(cathode materials for secondary lithium-ion batteries)

IT 11123-44-7 59205-70-8 198782-44-4, Lithium niobium titanium phosphate ($\text{Li}_{0.5}\text{NbTi}(\text{PO}_4)_3$) 198782-45-5, Iron lithium niobium phosphate ($\text{FeLi}_{1.5}\text{Nb}(\text{PO}_4)_3$)

Print selected from Online session Page 14 02/22/2003

RL: TEM (Technical or engineered material use); USES (Uses)
(cathode materials for secondary lithium-ion batteries)

Print selected from Online session Page 1 02/22/2003

L2 ANSWER 3 OF 3 REGISTRY COPYRIGHT 2003 ACS
RN 349632-79-7 REGISTRY
CN Calcium iron lithium phosphate (Ca0.1Fe0.9Li(P04)) (9CI) (CA
INDEX NAME)
MF Ca . Fe . Li . 04 P
AF Ca0.1 Fe0.9 Li 04 P
CI TIS
SR CA
LC STN Files: CA, CAPLUS, USPATFULL

Component	Ratio	Component Registry Number
04P	1	14265-44-2
Ca	0.1	7440-70-2
Li	1	7439-93-2
Fe	0.9	7439-89-6

4 REFERENCES IN FILE CA (1962 TO DATE)
4 REFERENCES IN FILE CAPLUS (1962 TO DATE)